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Leading the charge for recycling.™

CHARGE UP SAFETY: ADDRESSING LITHIUM BATTERY MANAGEMENT

ENVIRONMENTAL SHOW OF THE SOUTH, MAY 2018

Tim Warren, Regional Account Manager

Overview of Call2Recycle

- 501c4 Non-profit battery recycling stewardship organization voluntarily founded by battery manufacturers in 1994 to deal with emerging state and federal regulation framework

- RBRC = Call2Recycle, Inc.
- North American stewardship program approved by governments in New York / British Columbia / Quebec / Manitoba / Vermont as the mandatory battery compliance scheme.
- Have collected consumer batteries since 1996 (144 million pounds recycled) from retail, business and municipal sites via both a box and bulk program.

- The first “**Product Stewardship** ” program in North America.

Call2Recycle Assists Local Governments in battery collections and recycling

For your residents:

- No cost rechargeable battery recycling-boxes or bulk
- Fee Based: Flat rate all battery boxes for primary batteries or bulk shipping of sorted batteries (flat rate plus freight)
- GreenVantage Plus Program: Larger communities/Districts: Offset pricing/rebate for rechargeable batteries shipped in bulk when bundled with primary batteries

www.Call2Recycle.org/start-recycling

What Are Our Responsibilities?

Program Management Services

1. **Reverse Logistics Management**. Manage collection, pick-up, transport, sorting and processing.
2. **Education & Promotion**. Educate consumers, collection sites and businesses on why and how to recycle compliant to DOT regulations; partner with stakeholders on educational messaging.
3. **Administration & Performance Reporting.** Regulatory submittals, reporting on battery weights and chemistries, certificates of recycling, downstream verification, etc.
4. **Customer Service**. Call Center that manages 10,000 inquiries per month.

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Call2Recycle 2017 Collection Results

- 14 million lbs. of batteries collected and recycled in US and Canada, including 8 million lbs. in the United States
- Increased primary battery collections by 24% in our first year of a national new program initiative to 1.7M lbs.
- **Lithium ion collections grew nearly 15% to 2.2 M lbs.**
- VT- primary battery EPR law state- grew collections to 81,000 lbs., from 59,000 lbs. the first year of the state program (administered by Call2Recycle)

Marketplace Growth of Consumer Batteries

1. 3 billion batteries sold annually in the US (USEPA)
2. 80% single use (primary) 20% are rechargeable
3. Lithium Ion has replaced NiCad, and to a lesser extent, Ni-MH, SSLA
4. Both rechargeable and single-use batteries are recyclable:
   - Rechargeable recoverable metals: lead, cadmium, nickel, lithium, copper, cobalt, iron/steel
   - Single Use: zinc, manganese, steel, lithium, copper

TYPES OF CONSUMER BATTERIES

Nickel Metal Hydride
(Ni-MH)

Nickel Cadmium
(Ni-Cd)

Nickel Zinc
(Ni-Zn)

Small Sealed
Lead Acid
(SSLA/Pb)

Lithium Ion
(Li-Ion)

Alkaline/Lithium Primary
(for a fee)

Cellphones

How Can You Identify a Lithium-Based PRIMARY Battery?

Lithium Metal (Primary) Single Use

- How they are sold in the consumer marketplace: 9v, AA, AAA, C, D, Coin/Button cell
- They **MAY** be marked: ‘Lithium’ or ‘Lithium cells’; marked as (CR###)

How Can You Identify a Lithium-Based RECHARGEABLE Battery?

Rechargeable (Lithium Ion)

- It **MAY** be Marked “Rechargeable”
- It **MAY** Have a Battery Chemistry Name (Lithium Ion) or Abbreviation (LI-ION, Li-ion, LiPo (lithium polymer)
- It **MAY** Just Have Battery Seal, other or no Marking



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How are batteries collected?

Batteries: What's changing? Why?

- Landslide move by consumers to products that are mobile/cordless
- Americans love affair with smart phones, iPads, tablets etc. for instant access to information and communication
- Batteries for these devices are lighter, smaller, contain more energy/power, charge faster and hold longer charges
- Larger, more powerful batteries in lawn mowers, chainsaws, etc.

- **Changing Battery Chemistries = Changing Impacts**

- Decline of **NiCad** : Lessening of Toxicity Impacts
- Popularity of **Li-Ion**: Less Environmental, more Safety impacts
- 5.6 billion Li-Ion cells sold globally in 2016
- Battery fires are in the news and becoming a recognized issue for some consumer products (CPSC recalls)
- Battery safety and fire issues are increasing for waste transport, processing and disposal and even battery recycling



Our Lithium Battery Experience

- We have handled approximately 5 million boxes of consumers batteries since inception and untold numbers of bulk shipments .
- Historically, 24.3% of our collections (35 million lbs.) have been lithium chemistry batteries.
- We've collected, transported, sorted and processed lithium-based batteries from over 14,000 active collection sites across North America.
- Since the beginning of 2016, our lithium-based batteries have been transported and processed in Canada, Belgium and Korea; there are currently no US processors of lithium batteries (although there are US sites that will accept, shred or treat them).

- **Until recently, safety/fire incidents have been very isolated**.

Battery Terminals Must Be Protected

Here's Why

Many batteries hold a residual charge even when they appear dead. When this battery comes into contact with other batteries or metal, a spark or excessive heat can occur.

Unprotected battery terminals are dangerous.

Heat from Short-Circuited Lithium-Based Batteries Can Cause Fires

Why Are Safety Incidents Increasing?

1. As more mobile products using batteries (e.g. toys, tools, electronics) are sold, batteries are **flooding the market**.
2. Battery chemistries can be **hard to identify** making it difficult to know which are hazardous and require special handling.
3. As the **power** of batteries increases and sizes shrink (energy density), damaged or defective batteries release more energy.
4. Sales of **counterfeit batteries**, which are more likely to cause safety incidents, are increasing.
5. The **design of products**, affixing a more powerful battery into a smaller product, creates a premium on design and, in some cases, increases risks.
6. Batteries are being damaged in processing of waste streams

Recycling Lithium-Based Batteries

Four Important Lessons

1. **A Spent Battery Isn't**. Used lithium batteries can often maintain 80%+ of their original charge.
2. **Don't Remove Non-Removable Batteries**. Lithium polymer batteries, without hard cases, are susceptible to damage.
3. **Tape or Bag**. The positive terminal must be protected either by tape or place in a clear and sealable bag.
4. **Curbside Collection Is Seldom Wise.** While some municipal governments have effective programs to mitigate safety issues, most do not. Find a dedicated collection container / site.

Call2Recycle Operational Safety Policies

1. **Individually bag or tape all batteries!**
2. Collection sites that ship batteries with positive terminals that are not protected according to U.S. DOT requirements may face suspension/termination.
3. Batteries considered to be damaged, defective or recalled must be shipped separately in U.S. DOT-approved packaging.
4. Call2Recycle only accepts Call2Recycle boxes or other containers we have pre-approved. (UN 4 GV rated boxes)
5. Boxes should be shipped when they are full (up to 66 lbs./30 kgs) or within one year of the first battery being collected.

Watch for Lithium-Based Batteries that Show Signs of Damage Such as Swelling, Smoking, Leaking or Overheating.




Do NOT place damaged lithium-based batteries in a collection box or drum for recycling with other batteries. Immediately put them in an absorbent, non-flammable material (sand or cat litter) in a cool, dry area.

The U.S. DOT requires special packaging for shipping defective, damaged or recalled (DDR) lithium-based batteries.

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DDR Solution for compromised Li-Ion Batteries

	Small Kit	Large Kit
Kit		
Kit Contents	• Overpack box • Metal can with return shipping label • Metal lid and locking ring • Vermiculite • Tape • Plastic bags • Permit and caution labels • Return shipping label • Instructions • Recycling of all batteries	• Overpack box • Metal bucket with return shipping label • Metal lid and locking ring • Inner box • Vermiculite • Tape • Plastic bags • Permit and caution labels • Return shipping label • Instructions • Recycling of all batteries
Note	*US & Canadian Special Permit allows for no more than 4.4 lbs. (2kgs) of lithium cells and batteries to be contained in a single package. However, a single cell or battery may be shipped within one package provided the cell or battery has a mass of 5 kg or less.*	

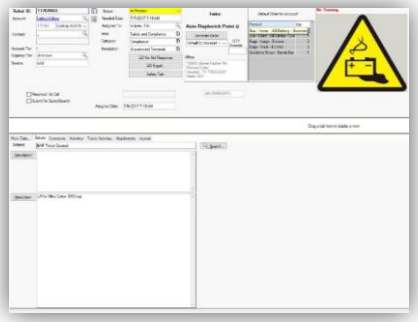
Call2Recycle's *CHARGE UP SAFETY* Campaign

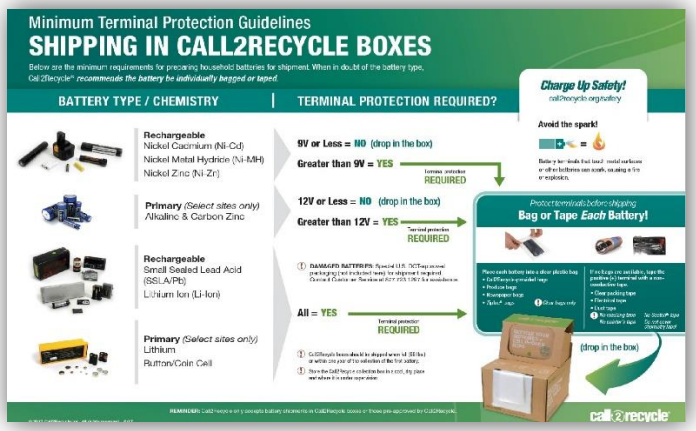
Four Main Objectives

1. **Foster Employee Leadership**. Improve our knowledge, culture and commitment to safety to enable us to serve as leaders and influencers with customers.
2. **Improve Collection Site & Sorter Performance**. Increase visibility, accountability and behaviors surrounding safe handling, storage and transport of batteries.
3. **Drive Awareness thru Education.** Improving the visibility and knowledge of safe practices. Safety training on website for customers by Dec 2017
4. **Engage Stakeholders**. Build relationships with other like-minded organizations to influence public and government debate on relevant safety issues.

Charge Up Safety™: Operational Changes

- **Flame Retardant Box**.
- **Terminal Protection Guidelines**.
- **Box Anomaly Reports (BAR).**





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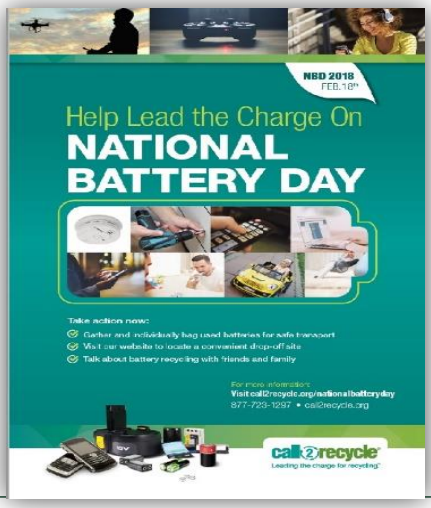
Charge Up Safety™: Consumer Education

- **Safety Video**.
- **Safety Portal**.
- **Consumer Outreach Events.**



Steps you can take in your program:

- Expect to receive lithium batteries and have a plan in place to manage at your MRF, transfer station, etc.
- **Train staff: Access our safety training PP at www.call2recycle.org/safety-training**
- Isolation kit advisable for compromised/damaged lithium ion batteries (DDR Kit or equivalent)

- Develop consumer education messaging to inform residents **not** disposing of Lithium based batteries in the trash; rather promote drop off sites for their safe recycling
- Promote our Collection Site Locator (http://www.call2recycle.org/locator/) to your residents

Resources

Visit the new Call2Recycle Safety Portal:

www.Call2Recycle.org/safety

- Safety presentation for training your staff
- Downloadable Safety training video
- YouTube battery safety 101 video
- FAQs
- Other links/technical assistance resources

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Closing Thoughts/Wrap up

- **Batteries are growing in the marketplace and need to be recycled- not trashed-especially rechargeable batteries!**
- Basic safety requirements (tape or bag > 9V and all lithium) are needed for managing batteries (DOT regs)
- Consumers want to recycle batteries-one of highest requests by consumers
- Drop off centers (local government or retail) and collection events are BMPs for collecting batteries
- More battery education is needed for the waste industry, your employees and for the public
- Public/private partnership is needed to grow recovery of batteries that otherwise are lost in the disposal stream.
- Call2Recycle is among the companies that can assist with recycling your batteries compliantly and safely

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thank you!

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